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AUTHOR Anderson, Kristine L.
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ABSTRACT

Reasons for the lack of agreement among studies of persistence are considered, using a simplified causal model. Two major theoretical perspectives used in studying the educational careers of college entrants are summarized: (1) the Tinto or institutional persistence theory, which draws mainly on the discipline of education and applied institutional research; and (2) the discipline of sociology and social stratification. Attention is directed to differing conclusions about the importance of demographic and family background variables in explaining college persistence. The influence of how persistence is defined and the nature of the institution where data is collected is emphasized. A simplified model of selected background and post-college entry influences is estimated within four types of institutions (private liberal arts colleges, research/doctoral universities, public comprehensive four-year colleges, and two-year community/junior colleges. Persistence in a single college as well as persistence in higher education at several points in time are examined. Differences in results found in the analyses are tied to theoretical and statistical issues. Thirty-two references are cited. (Author/SW)

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Persistence, Student Background and Integration/Commitment:
Variation by Definition of Persistence and Institutional Type

Kristine L. Anderson
Department of Sociology and Social Psychology
Florida Atlantic University
Boca Raton, Florida 33431

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Texas A&M University
Department of Educational
Administration
College Station, TX 77843
(409) 845-0393

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PERSISTENCE, STUDENT BACKGROUND AND INTEGRATION/COMMITMENT;
VARIATION BY DEFINITION OF PERSISTENCE AND INSTITUTIONAL TYPE

ABSTRACT

This paper demonstrates some of the reasons for the variation in conclusions about the importance of demographic and family background variables in the understanding of college persistence. It focuses on the difference in conclusions one might make dependent on the definition of "persistence" and the nature of the institution(s) in which one undertakes data collection. A simplified model of selected background and post-college-entry influences is estimated within four different types of institutions (private liberal arts colleges, research/doctoral universities, public "comprehensive" four-year colleges, and two-year community/junior colleges, and using multiple definitions of persistence (persistence in an individual college, persistence in higher education at several points in time). The differences in results found in the analyses are tied to theoretical and statistical issues.

Persistence, Student Background, and Integration/Commitment: Variation by Definition of Persistence and Institutional Type

What determines which college entrants persist in their educational endeavors and which do not? Attempts to answer this question have filled thousands of books and journal articles. Yet, beyond some simple homilies (such as, those who persist are those who intend to persist), answers are frequently at odds with each other. A common response by scholars in the field of educational research is to focus on the few areas of agreement (generally on predictors that are most proximate to persistence, such as goal and institutional commitment and integration, or academic success vs. failure) and to ignore differences in results across studies. The purpose of this paper is to demonstrate and discuss some of the reasons for the lack of agreement among studies of persistence, using a simplified causal model.

Theory, Definitions and Predictors of Persistence

To establish the basis for the causal model estimated here, and to lay the ground for discussions of the role of theory in shaping the results of studies, the section below summarizes two major theoretical perspectives used in studying the educational careers of college entrants. The first, referred to here as the Tinto or institutional persistence theory, draws primarily on the discipline of education, and applied institutional research. The second draws more from the discipline of sociology and theoretical interests in social stratification.

Research from both theoretical perspectives is associated with the increased use of longitudinal causal models and multiple regression analysis for research on college students' educational attainment.

Institutional Persistence Models. Most current research on college attrition draws on the model developed by Tinto (1975). The Tinto model emphasizes the importance of goal and institutional commitment, and social and academic integration into the college as predictors of decisions to persist or

drop out of a particular college. Controls for relevant pre-college factors may be included. Studies using this model have generally defined dropout vs. persistence as only "voluntary", "nonacademic" withdrawal from a particular institution as opposed to remaining at that institution. The basic outline of the model has been confirmed by a number of recent studies. Pascarella and associates (Pascarella and Chapman, 1983; Pascarella, Duby and Iverson, 1983; Pascarella and Terenzini, 1980, 1983; Terenzini and Pascarella, 1977).

Most studies using this model find little evidence for main effects of student background. In fact, most studies include only a small number of student background factors. For example, Bean (1985) includes only "prematriculation academic performance", and assumes that family background and individual attributes not included are "manifest here primarily in the social psychological variables" (p. 52). Studies on persistence in individual institutions confirm this lack of importance of family and educational background. Simpson, Baker, and Mellinger (1980) found that, controlling college GPA, none of the family or educational background factors considered (including income, father's education, minority status, high school grades, SAT scores, educational aspirations, and community size) had significant effects on withdrawal from Berkeley. Getzlaf, Sedlacek, Kearney, and Blackwell (1984) found only an effect of quantitative ability, with no significant effects of family background, when predicting dropout vs. persistence at Washington State, and effects only for verbal ability in predicting dropout vs. transfer. In a summary of a number of studies, Terenzini and Pascarella (1980) report that "the characteristics students bring with them to college do not appear in themselves to be significant factors in Students' subsequent attendance behavior. In none of the six studies they summarize could "reliable predictions of attrition status be made solely on the basis of pre-college traits" (p. 280). Pascarella and Chapman (1983), in a study of 11 institutions divided into three types,

report that background characteristics explained only 2 to 3 percent of the variance in college withdrawal rates. Using the same data, dividing institutions into four types, Pascarella and Chapman (1983b) report only one significant direct effect of a background variable on withdrawal (affiliation needs negative in two-year commuter campuses). In summary, student pre-college background is seen as relatively unimportant, and relevant only as it shapes psychological orientations to specific institutional environments.

On the other hand, studies have found substantial support for direct effects of some indicators of social and academic integration (Terenzini and Pascarella, 1980b). Less support has been found for effects of goal commitment (Pascarella, Duby and Iverson, 1983), again reflecting the focus on withdrawal from a single institution, merging dropouts and transfers. One multi-institution study of persistence in higher education found much stronger effects of goal commitment (Munro, 1981). Those studies using measures of attitudes toward institutions find smaller effects of "institutional commitment" than those using measures of plans to persist in an institution (Bean, 1980). Some research within the institutional persistence tradition has begun to explore variation in the effects of variables in different kinds of institutions. For example, Pascarella and Chapman (1983a,b), and Pascarella and Terenzini (1983) have compared results of a causal model across a number of institutional types, though their sample of 11 colleges limits generalizability of results. However, there is strong interest within this perspective in contextual differences in the determinants of persistence. This is a consequence of the greater "applied" interest in the prediction of persistence in individual institutions, and in predictors that might be altered through institutional programs and policies.

Sociological Status Attainment Perspective. From the disciplinary perspective of sociology, "status attainment" models of college outcomes reflect

a different focus than institutional persistence/dropout models. Two basic questions are addressed: (1) to what degree do differences in colleges and student experiences therein introduce unique variation in achievement, and (2) to what degree do colleges and experiences mediate the effects of ascribed social status and "merit". Thus, models have generally examined persistence/dropout from the higher education in general rather than one institution, and have focused more on the direct and indirect effects of pre-college background factors of ascribed statuses, prior achievement, and aspirations. Status attainment models have been less concerned with intervening social-psychological processes than have institutional persistence models. Variables such as institutional "fit" or academic and social integration and commitment are seen as important only to the extent that they mediate background effects, or add to variance explained. Studies done using this model generally support the view that student background factors are significant predictors of educational outcomes. There is usually no separation of "voluntary" and "involuntary" dropout. Instead, academic performance is included as a predictor of educational outcomes, so that its effect is controlled when examining other factors which might cause "voluntary" attrition. Unless one believes that the other predictors of outcomes are different for students with adequate vs. inadequate grades, there is no reason seen to separately analyze voluntary and involuntary attrition. Strong support is generally found for effects of race, sex, social class, religion, academic aptitude and preparation, and other aspects of family and academic background, even controlling for institutional type and social/academic integration or commitment variables (see for example, Alwin, 1974; Anderson, 1980; Velez, 1985, 1983; Griffin and Alexander, 1979; Thomas, 1981). There has been relatively little attention to contextual differences in the determinants of educational outcomes. In fact, it is far more common for sociologists to be interested in the contextual main effects

themselves, since selection or recruitment into types of institutions is seen as one route of status transmission across generations.

Summary of the Causal Model

Thus the two perspectives vary in (a) what dependent variable they are ultimately interested in understanding - institutional persistence or persistence in higher education toward the goal of graduation, (b) the variables believed to be most important in understanding that dependent variable, and (c) the conclusions about the importance of different types of predictors, especially the role of "background" variables. Even within each of these perspectives, studies commonly vary in the particular background and/or integration/commitment variables that are found to be empirically important. The analyses below are used to (a) demonstrate the impact of one's theoretical perspective on the results of studies, and (b) suggest some reasons, both theoretical and statistical, for the differences in findings across studies. The model is deliberately simplified for this primarily pedagogical objective. It includes a set of "background" variables, including sex, race, socioeconomic status, academic ability, high school achievement, and both student and parent educational aspirations. A second set of variables includes factors more relevant to the institutional persistence model -- performance in college (one measure of "academic integration"), satisfaction with the college first entered (an admittedly rough indicator of aspects of both integration and institutional commitment), educational goal commitment after college entry, and a measure of the number of hours worked (corresponding to extent of involvement in an activity that tends to compete with involvement in college activities). All four of these variables are measured at a point corresponding to the second year after high school graduation.

Methods

Sample

The analysis uses a subset of the National Longitudinal Study of the High School Class of 1972 (NLS). The NLS is a nationwide sample of students who were high school seniors in 1972. Follow-up surveys have been conducted in 1973, 1974, 1976, and 1979, with high response rates (see Levinsohn et al, 1978 for description of sampling, follow-up procedures, and response rates). Only those students who entered either two-year or four-year colleges, in "academic" programs (defined as leading ultimately to a four- or five-year degree - see Eckland et al, 1979), by the Fall of 1972 were used. The study excludes delayed entrants, because of the relatively short (seven-year) follow-up period at this time. Unweighted data were used. The sample probably is biased by disproportionate loss of lower SES and minority students, and highly mobile students. Since our focus is on patterns of relationships, rather than on descriptive statistics of a population, this should not be a serious problem. Missing data on individual variables were dealt with by the mean-substitution method described by Cohen and Cohen (1975, 1983). This is a basically conservative procedure, which does not affect the magnitude of unstandardized regression coefficients, but tends to attenuate standardized coefficients. To be included in the analyses, respondents had to have complete information on the dependent variables (persistence and graduation). Since these were taken from composites, only a small proportion were excluded on this basis (see Eckland et al, 1979 for information on the composites). A more serious potential sample bias lies in the requirement that there be a FICE code in the NLS data set that could be merged with the institutional data, and that there be non-missing information on the college context variables for that institution. This reduces the sample by about two-fifths. Means, standard deviations, and the proportion of missing data recoded to the mean are shown in Appendix 1 for each of the four

institutional types.

Measurement of Institutional Types

Institutions are grouped into four types for this analysis. Decisions to use these four types and decisions about criteria defining the types were guided by literature on institutional contexts, prestige, and college effects on students (see for example, Astin and Lee, 1972; Dunham, 1969; Kamens, 1974; Keeton, 1971; Pace, 1974; Karabel, 1972; London, 1978).

Information on the first college attended by each student was obtained using a file merging the F.I.C.E. codes for institutions attended and data on institutions taken from several sources (Carroll, 1979; Tenison, 1976). The classifications involve four variables from the institutional data sets: affiliation (Public, private, etc.), Carnegie classification (research university, doctoral university, comprehensive college, liberal arts college, etc.), institutional size (total enrollment), and the percent of freshmen who live on-campus (originally coded in deciles). The four resulting types are:

1. Public junior/community colleges (N=1092). These colleges are generally low in academic and socio-economic composition. Tuition is low, and a large percentage of students work and attend only part-time. Few schools have on-campus housing. The students included in this analysis are only those who were enrolled in academic/transfer tracks within two-year colleges upon entry.

2. Private liberal arts colleges (selective or unselective) and other private "comprehensive colleges" with less than 4500 in student enrollment (N=730). Thus, these are small private colleges with a focus on undergraduate liberal arts instruction, with no significant graduate programs. For ease of reference, these are referred to as liberal arts colleges, even though not some are small "comprehensive" colleges. They are relatively high in the proportion of students who are full-time, residential, non-working students. These colleges tend to have a high sense of community, and high student/faculty

contact. Many have some religious affiliation.

3. Public comprehensive colleges with less than half of the freshmen living on campus (N=689). These are the classic "commuter colleges", with a diverse student population. These colleges lack doctoral programs, but have both liberal arts and vocational/professional programs. The colleges rank little above two-year colleges in average ability and SES. They are relatively large, though smaller than the research/doctoral institutions. They tend to be lower in cohesion, with relatively low faculty/student contact.

4. Research or doctoral institutions with greater than half of the freshmen student population living on-campus (N=808). These are more prestigious institutions with more "traditional" students: higher in ability and socio-economic status; more likely to be full-time, residential, non-working students.

Measurement of Variables in the Model

Brief descriptions of the operationalization of each of the predictors and measures of educational persistence are given below. The variable name used in figures and tables precedes the description, in capitals.

Student Pre-college Background Characteristics. These variables include several of the commonly used indicators of a student's family background, previous academic performance, and goal orientation. All are measured before entry to college.

MALE: the student's gender, with males coded as 2 and females as 1.

BLACK: student racial/ethnic identification with black coded as 2 and all other as 1.

SES: A summary measure of student socio-economic status, including the indicators father's education, mother's education, paternal occupation, family income, and parental household possessions. For details see Levinsohn et al (1978).

HSGPA: A base-year self-report of average high school grades.

ABILITY: The sum of standardized scores on the base-year reading, letter groups, math, and vocabulary subtests. Reliability and validity data are available in Levinsohn et al (1978).

PARASP: Parental aspirations (PARASP), the average of student perceptions of mother's and father's aspirations for the student's educational attainment, from the base-year survey.

EDGOAL1: Educational goal, a base-year measure of the level of education the student expected to attain.

ACADSC: Academic self-concept, a base-year measure of confidence in ability to do well in college.

College Integration and Commitment Variables. Included here are four admittedly rough indicators of student academic performance in college, integration and institutional commitment, goal commitment, and involvement in college.

COLGPA: College grades in the first two years, taken from self-report data in the first follow-up survey. In addition to indicating level of academic performance, this can be viewed as one component of academic integration.

COLSAT: A measure of overall satisfaction with education since high school, taken from the first follow-up survey. Indicators of degree of satisfaction with teachers, social life, development of work skills, intellectual growth, and amount of money the student had to get along on were averaged. This can be seen as a rather rough indicator of institutional integration and commitment.

EDGOAL2: A first follow-up question about level of education expected (from only high school to Ph.D./M.D./L.L.D). This is used as an indicator of goal commitment.

WORKHRS: A measure of the number of hours normally worked per week, while in school. Taken from the first follow-up and referring to October, 1972 (and

thus during a period when they were also enrolled in college). This serves as one indicator of the time available for involvement in both social and academic activities of the college.

Measures of Educational Persistence. These are a series of indicators, all dichotomous, of persistence in college. The first represents persistence in the same institution, referred to as institutional persistence. The remainder refer to persistence in some form of academic higher education, referred to as goal persistence.

SAME2: A dichotomy indicating whether the student persisted in the same institution (2) or not (1) from 1972 to 1973 (the second year of college). Note that this includes both voluntary and academic withdrawals, along with transfer students in the same category.

P2: A dichotomy for persistence in higher education (2) or dropout (1) from 1972 to 1973.

P3: A dichotomy for persistence in higher education (2) or dropout (1) from 1972 to 1974 (the third year of college).

BA76: A dichotomy for attainment of a baccalaureate degree by the fourth follow-up in 1976, with graduates coded as 2 and non-graduates as 1. This is a measure of "on-time" graduation.

BA79: A dichotomy for attainment of a baccalaureate degree by the fifth follow-up in 1979, with graduates coded as 2 and non-graduates as 1.

Findings

Tables 1 to 4 show the results for the four institutional types. For each, there are ten equations estimated -- two for each measure of educational persistence. In the first of each pair only the background variables are included. Following this is the complete equation, adding in the integration/commitment variables. Significant coefficients are indicated by

asterisks. Both the "raw" R^2 and the R^2 adjusted for sample size and the number of variables in the equation are given at the bottom of each table.

The Impact of Definition of Persistence

If a researcher simply examined the combined effects of background on institutional persistence, as indicated by the explained variance for the first equation in each group, s/he would certainly assert that student background makes no difference. Explained variance ranges from one to two percent. Even when examining goal persistence to the second year, background has little predictive power, with explained variance ranging from one to four percent. But as the span of time increases, cumulative effects of background emerge, especially at liberal arts and community colleges. And, in general, effects are even greater if one uses college graduation, on-time or late, as the measure of goal persistence. And, the effects of background are cumulative, increasing with the length of perspective taken on the definition of "persistence". Individual background variables reflect this general trend. For example, in Table 1 on private colleges, no background variables significantly affect institutional persistence; two are significant for P2, four are significant for P3, and 5 for BA79. The pattern is less clear in Tables 2 and 3, for research universities and public commuter colleges. The effects of SES in research universities do increase from SAME2 to P2 to BA79, academic self-concept is significant for P2 but not SAME2, and the effects of HSGPA are most apparent for graduation. In Table 3, the effect of being male changes from positive for SAME2 to negative for graduation; and significant effects for PARASP and EDGOAL1 appear for graduation, but not earlier goal or institutional persistence. Similarly, in Table 4 for two-year colleges, only HSGPA is a significant predictor of institutional persistence, but P2 is significantly related to HSGPA, EDGOAL1, and ACADSC. The effects of PARASP also are substantial for P3,

and both graduation indicators.

College academic performance also would appear to be unimportant if one examines only institutional persistence. In only one of four contexts does it have a significant effect and that (in private liberal arts colleges) is negative. Even early goal persistence is only marginally related to performance, and again the only significant effect is a negative one in two-year colleges. But a longer term measure of goal persistence indicates substantial effects of early college grades, even controlling for college satisfaction and later goal commitment. College satisfaction or integration is significantly related to institutional persistence only in research universities, but has sporadic effects on measures of goal persistence in all four contexts. Goal commitment has stronger effects on P2 and P3 than on either institutional persistence or graduation. Finally, work involvement negatively affects institutional persistence in only two contexts (community colleges and private liberal arts colleges), but affects BA79 in all four.

To summarize, if one looked at institutional persistence, one would generally conclude that (a) student background is unimportant, except perhaps for how students performed in high school (b) college academic performance is unimportant or perhaps a negative factor, (c) goal commitment and varying dimensions of integration (college satisfaction in some, work involvement in others) are important, but (d) only eight to ten percent of the variance in persistence can be explained by both sets of variables. Thus one would be led to view persistence as affected a bit by high school achievement, a bit by educational goals, and a bit by involvement or integration into the college. Therefore, a researcher would be most likely to continue the search for additional predictors closely related to these three factors. And institutions would be led to consider using high school grades as selection devices and to devise policies to encourage student goals and involvement.

On the other hand, researchers doing follow-up studies examining goal persistence or graduation rates of students would, in addition to the significant factors noted above, conclude that background factors such as social class, sex, parental support for college graduation, and academic self-concept and early performance in college have important influences on students careers. And their models would explain closer to twenty percent of the variance in "persistence" within a given institutional context. As a consequence, institutions might be led to consider special programs for students with low SES, programs to encourage parent supportiveness, or programs aimed at increasing freshmen study skills and so their grades.

Even the difference between looking at second and third-year goal persistence would lead to varying conclusions. For example, it is at P3 that a number of background variables reach significance, either further increasing for measures of graduation or appearing only for that time period. Black students in liberal arts colleges have an advantage only for P3. Men entering community colleges are more likely to persist to the third year, though less likely to graduate on time.

The Impact of Varying Institutional Contexts.

Both single and multi-institution studies can vary on this factor. Obviously, single institutions can be of only one type. But multi-institution studies can vary in the mix and average type of institutions included in the sample. The results on the four types specified here show quite clearly the variation that can result. As arbitrary comparison points, let us examine the results for institutional persistence and for goal persistence to the third year.

Since the four institutional types parallel those used in Pascarella and Chapman (1983a,b) comparisons to their results in each type will be discussed.

In private liberal arts colleges, Pascarella and Chapman (1983b) found that freshmen year experiences, especially the institutional commitment generated during that year, were more important than either background or goal commitment. The results found here support the fact that involvement in college life (rather than work) is significant. However, goal commitment was also a strong predictor of persistence. In addition, a significant negative effect of college grades appears in this context (note that the sign of this variable is also negative in Pascarella and Chapman's analysis, though it is not statistically significant). Both analyses found no significant effects of student background.

Pascarella and Chapman also concluded that background was of little importance, relative to freshmen year experiences, in residential universities. In particular, they found strong effects of social integration (compared to academic integration) and institutional commitment (compared to goal commitment). This analysis found two significant background effects -- of socioeconomic status and high school grades. The difference in results on high school grades may reflect the focus in this analysis on both voluntary and academic withdrawal. However, the analysis also finds strong effects of educational goal commitment -- stronger than that of college satisfaction. It is doubtful that this can be attributed solely to the inclusion of the academic withdrawals, given the strength of the effect.

In both four-year and two-year commuter colleges, Pascarella and Chapman found somewhat stronger effects of background and stronger effects of academic than social integration. In four-year commuter colleges, they found positive effects of expected second semester GPA, negative effects of dating frequency, and strong effects of institutional commitment. In this analysis, two background effects were significant: gender (with males higher), and high school achievement. The only significant college experience variable is educational goal commitment. Neither work involvement nor college satisfaction was

significant.

In two-year colleges this analysis found significant effects of high school achievement, goal commitment and work involvement. This parallels some of the findings of Pascarella and Chapman, who found positive effects of friendships on campus (perhaps the converse of work involvement where one's friends are likely to be coworkers), and goal commitment. They also found negative effects of a variable not included here, affiliation needs.

There is no consistency across the two studies in the R^2 attributable to background vs. college experience variables. Given the difference in the number of variables included in each set, and the number of colleges examined, there is little reason to expect consistency. This study found that the R^2 due to background was greater in residential universities and two-year colleges; in Pascarella and Chapman it was highest in liberal arts and two-year colleges.

Turning now to goal persistence to the third year, some interesting patterns emerge. In small private colleges, black and higher SES students with high educational goals that are supported by parental aspirations are more likely to persist. These patterns are partly explained by the student's own goal commitment and lack of involvement in the competing activity of work. Grades and a subjective sense of integration into the school are unimportant.

In research universities, one would see an even stronger advantage for high SES students with supportive parents. The student's own goal commitment when in high school, makes no difference but achievement in high school is important. Parental support and high school achievement tend to work through increasing students' college performance and satisfaction. The later commitment to educational goals these students develop does make a difference, but their persistence is not harmed by work experience.

In public commuter colleges, gender, race, and social class have no

effects. The system is an entirely meritocratic one in which students' previous achievement and early goal commitment are translated into later college grades and goal commitment which increase persistence. However, students should be warned against employment, which lowers their involvement in school and encourages them to drop out.

Students who enter community colleges need a variety of background advantages. Those who enter being male, higher SES, with good high school records, parental encouragement of their goals, and confidence in their own academic skills are able to translate these into continuing goal commitment and persistence. As with their peers in four-year commuter schools, employment deters students' persistence in college.

Discussion

At this point, two influences on the conclusions of studies about determinants of persistence have been identified: the disciplinary or theoretical model used and the corresponding choice of a definition of persistence itself, and the nature of the institution(s) in which the study is conducted. But the question is -- why are there differences according to these two factors? One apparent answer with respect to the variation by definition of persistence is that these really are "apples and oranges" being compared. While both outcomes may be called persistence, the different treatment of transfer students is obvious. This generally operates to increase the impact of background factors when examining goal persistence. If a background variable differentiates between those who transfer and those who completely withdraw, as well as between those who remain at the first institution rather than transfer, and if the differentiation is in the same direction, then the two effects cumulate for goal persistence. For example, if higher SES students are more likely to transfer rather than completely withdraw, as well as more likely to remain at the first university attended, then the

effect of SES on goal persistence will be stronger than that on institutional persistence. Conversely, if a variable does differentiate between those who stay at an institution and those who transfer, but does not differentiate between dropouts and all others, then the effect may be significant only for institutional persistence. For example, college grades lower institutional persistence in private colleges, but not goal persistence: high performing students tend to transfer, perhaps to higher status but less expensive state universities. Many background variables appear to have stronger effects on goal persistence. While they are not particularly relevant to whether or not students are happy with a particular college, they are relevant to the choices made if they are not happy there -- to try again elsewhere rather than drop out of the system. And the background factors continue to operate in this way throughout the educational career, cumulating their effects. This implies a need for greater examination of complete educational careers ~~the~~ the patterns of dropping out, transferring, "stopping out", accumulating credits, and earning degrees. In particular, if a variable seems to vary in its effects on persistence measured at different points in time, it seems to indicate a more complex pattern to the educational career for students at high levels on that factor. For example, in liberal arts colleges, black students are higher in goal persistence to the third year, but not significantly higher on any other indicator of persistence. The same is true of higher SES students who entered two-year colleges. Studies of the careers of particular groups of students might help us understand these patterns of effects.

But another explanation of the difference in effects by definition of persistence lies in statistical "facts of life". Using dichotomous dependent variables violates assumptions of OLS estimation procedures. A better method would be the categorical alternatives of logit or probit analysis. However, OLS

estimates are commonly used in the research literature. The distribution of the dichotomy affects the extent to which this is a problem. When the distribution is nearly even (50/50), estimates are more reliable, with lower standard errors, than when the split is uneven. In most contexts, P3 and either BA76 or BA79 (depending on the entering college context) have the more balanced distributions -- and these equations also tend to show higher explained variance and more significant predictor variables. Differences could also reflect varying degrees of measurement error in predictors. For example, if the timing of measurement of a predictor (such as college integration or commitment) is a good measure of a student's feelings as s/he makes decisions about the third year of college, but was measured too late to be relevant to second year persistence decisions (as is likely to be true in the NLS), then effects may seem stronger for third than second-year persistence because of the differing levels of measurement error. This means that researchers need to be concerned with the quality and timing of measures, if comparisons across different educational outcomes are to be made.

Understanding the differing patterns of effects in different contexts reveals an even more complex picture. The most common explanation would involve discussion of the contexts themselves. For example, if we find that men are more likely to persist (SAME2) only in public commuter colleges, we might construct an explanation involving a college atmosphere that "fits" better with traditional masculine styles of learning or values. If one finds that black students are more likely to persist (P3) only in private colleges, one might infer that this is due to greater cohesiveness and support in such colleges. If SES makes a difference only in research universities, one might claim this is related to an elitist cultural climate or simply to the high financial costs at such institutions. It is relatively easy to come up with post hoc explanations for the differences, or to suggest that their explanation be the focus of

"future research".

But there are other explanations that need to be considered, and these are also relevant to interpretation of the results of single institution studies. These alternative explanations involve other violations of the assumptions of multiple regression analysis and other statistical limitations (for overview see Berry and Feldman, 1985 or standard texts on multiple regression).

The assumption of a properly specified model. Estimates of the effect of any single variable are valid only to the extent that the full model is correctly specified. If irrelevant variables are included, it makes little difference, unless the relevant variables you are interested in happen to be correlated with the irrelevant variables. For example, if race is actually irrelevant to persistence, but SES is relevant, the correlation of the two may lead to underestimates of the importance of SES. There are greater consequences if the model omits relevant variables, especially if they are related to those included. This tends not only to bias the coefficients of the variables included but also reduces the standard errors on the remaining variables. For example, if you have a measure of academic integration, but not one of social integration and the two are correlated, you are likely to overestimate the effects of academic integration -- it is picking up variation rightfully due to social integration.

So, if we find a stronger effect of a given factor in one context, it might simply indicate that the model is misspecified -- that there are additional factors that need to be included in a model for persistence in that setting. Yet we rarely consider this. We do commonly drop variables that appear irrelevant (which have near-zero or nonsignificant coefficients) but we rarely try to specify ahead of time factors peculiar to an institution or institutional type that should be considered. This not only may lead to low ratios of

variance explained, but may also bias estimates of the effects of the traditional predictors.

The assumption of no measurement error. Most researchers know that, in the bivariate case, measurement error simply tends to attenuate correlations; but in the multivariate case the situation is more complex. Coefficients may be biased either upward or downward. If the error is in just one variable that is not correlated with other predictors, only that variable will be affected, but if errors are correlated, effects are unpredictable. If measurement error varies across contexts, then differences in effects may reflect varying reliability rather than differences in causal effects. For example, if satisfaction is a good measure of integration/commitment in research universities, but a poor one in commuter colleges, then the differing results might be explained simply by measurement error, rather than differences in causal effects. One might even decide to omit a predictor in a final analysis, on the grounds it was not relevant, when it was relevant but simply poorly measured. Measurement error in the dependent variable might be even more critical. For example, being in school during the Fall term of the second year might be a less accurate indicator of actual "persistence" in some kinds of colleges, due to more temporary "stopping out" or variable term scheduling.

Other measurement issues. Patterns of selection and recruitment into different institutions or types of institutions mean that there are differences in the range and variation of predictors. Differences in the standard deviations of variables and the range of variation present may alter conclusions about predictors. Where variation in a predictor variable is low, standardized estimates of parameters for its effect are also likely to be low, and unreliable. Researchers have generally been told that one can still make cross-group comparisons using unstandardized regression coefficients rather than the Betas or standardized path coefficients. However, when comparing across studies

with different measures, or when authors have only reported standardized coefficients, this is not an option. Restriction of range can also lower or even alter the direction of effects. For example, if one studies students only in the lower-middle to middle-class range (for example from two-year colleges), effects of social class will appear smaller than if the entire range were represented. If the relationship is non-linear, with a reversal at the upper end, conclusions might also be misleading. For example, at research universities, the effect of EDGOAL1 is negative. This might simply reflect a pattern in which those who initially said they wanted doctoral degrees are lower in persistence than those who said they wanted masters degrees, rather than a general negative effect. The effect of SES in that context might also reflect merely an advantage for the very highest over the moderately high in SES, rather than a disadvantage for lower class vs. middle class students. Thus one needs to combine information on the means, variances, and coefficients to gain knowledge of the causal processes. It may also explain why studies done using status attainment approaches find greater support for "background" effects than those using the institutional persistence model. Status attainment studies are generally done on large, multi-institution samples with broad and representative ranges on such factors as race, SES, or academic preparation. But within a single institution, as with most institutional persistence studies, there is likely to be much greater homogeneity and restriction of range.

The assumption of no multicollinearity. If one predictor is either perfectly linearly relate to one or more other predictors, or the relationship is strong (e.g., a correlation of .80 or greater), then the standard error of each coefficient tends to be large. This means that it is difficult to separate out the separate effects, and that coefficients are unlikely to be statistically significant. If predictors are multicollinear in some institutional contexts,

but not others, then individual predictors might be statistically insignificant in some, but not others. This could be so even if a particular variable was equally important -- as seen in an unstandardized coefficient -- in both. For example, it is quite possible that social and academic integration would be more highly correlated in cohesive colleges than in commuter colleges. If so, the effects of each might actually be significant only in commuter colleges.

Conclusions

Out of this discussion come a number of recommendations that would help to increase our understanding of college student persistence. Most of these recommendations involve (a) greater attention to building theories of persistence, and (b) providing more information about the results of particular studies.

Discussion of the differences in results when examining different educational outcomes alerts us to the need to develop models which are truly longitudinal, looking at entrances, exits, and reentrances to college, as well as general progress toward a degree. At a minimum, we need to be alert to the differences in definitions used by different groups of researchers.

It is also clear that we need greater work on specification of theoretical models appropriate to different contexts. The combination of low R^2 and the problems of model misspecification indicates that we need to extend our reach by considering different disciplinary approaches, qualitative literature on different college contexts, and other resources to more fully develop causal models.

The discussion of the confounding of measurement and statistical problems with differences between causal processes in different settings might lead one to throw up their hands in frustration. It appears that one cannot know whether results reflect real differences in causal effects or differential measurement error or specification error. However, there are ways to diagnose the existence

of many of these confounding statistical issues.

A last recommendation is that researchers present as much statistical information as possible in published reports, or have it available to interested colleagues. Information on the measurement of variables, the means, standard deviations, and reliability, standardized and unstandardized regression coefficients along with standard errors or greater detail in significance levels, would aid other researchers attempting comparisons across studies.

Table 1

Determinants of Persistence in Private Liberal Arts Colleges (N=730)

	SAME2	SAME2	P2	P2	P3	P3	BA76	BA76	BA79	BA79
MALE	-.026 (-.030)	-.038 (-.044)	-.018 (-.028)	-.028 (-.044)	.011 (.014)	.002 (.002)	-.034 (-.034)	-.036 (-.036)	.003 (.003)	.002 (.002)
BLACK	.099 (.071)	.064 (.046)	.057 (.057)	.013 (.013)	.147** (.112)	.097 (.074)	.081 (.050)	.060 (.037)	.104 (.076)	.067 (.049)
SES	.002 (.001)	.000 (.001)	.002 (.030)	.000 (.014)	.006** (.104)	.004 (.075)	.002 (.036)	.001 (.020)	.007** (.119)	.055** (.098)
ABILITY	.038 (.058)	.021 (.032)	.020 (.041)	-.007 (-.015)	.031 (.050)	-.000 (-.001)	.076* (.099)	.054 (.071)	.072* (.110)	.042 (.065)
HSGPA	.001 (.001)	.004 (.026)	.003 (.030)	.003 (.025)	.009 (.058)	.007 (.047)	.025** (.135)	.020* (.105)	.022** (.139)	.016* (.100)
PARASP	.044 (.093)	.031 (.064)	.040** (.117)	.028* (.082)	.065** (.145)	.049** (.109)	.036 (.066)	.019 (.035)	.036* (.077)	.021 (.045)
EDGOAL1	.046 (.059)	-.020 (-.025)	.048* (.085)	-.015 (-.026)	.086** (.117)	.010 (.013)	.091** (.101)	.037 (.041)	.087** (.112)	.029 (.037)
ACADSC	.002 (.003)	-.030 (-.042)	.034 (.066)	.004 (.008)	.032 (.046)	-.009 (-.014)	.077* (.091)	.036 (.043)	.040 (.055)	.008 (.001)
COLGPA		-.030* (-.090)		.002 (.009)		.006 (.019)		.023 (.060)		.033** (.101)
COLSAT		.041 (.060)		.007 (.015)		.027 (.042)		.069* (.088)		.031 (.046)
EDGOAL2		.124* (.273)		.116** (.355)		.141** (.331)		.098** (.189)		.105** (.236)
WORKHRS		-.004* (-.080)		-.003* (-.074)		-.004* (-.082)		-.003 (-.059)		-.004* (-.082)
R ²	.025	.092	.051	.155	.091	.190	.100	.151	.120	.191
ADJ. R ²	.014	.077	.040	.140	.081	.176	.090	.136	.110	.178

*Significant, $p < .05$ **Significant, $p < .01$

Table 2

Determinants of Persistence in Research/Doctoral Universities (N=808)

	SAME2	SAME2	P2	P2	P3	P3	BA76	BA76	BA79	BA79
MALE	.019 (.023)	.006 (.008)	.031 (.049)	.022 (.034)	.027 (.032)	.019 (.023)	-.004 (-.004)	-.005 (-.005)	.049 (.058)	.048 (.057)
BLACK	.080 (.049)	.012 (.007)	.014 (.011)	-.044 (-.035)	.073 (.044)	.011 (.007)	.026 (.013)	-.030 (-.015)	-.028 (-.017)	-.098 (.058)
SES	.006** (.097)	.003 (.060)	.006** (.138)	.004** (.095)	.009** (.168)	.007** (.124)	.009** (.130)	.006** (.088)	.009* (.154)	.006** (.099)
ABILITY	.037 (.049)	-.001 (-.001)	.019 (.033)	-.020 (-.035)	.023 (.044)	-.033 (-.044)	.088* (.097)	.024 (.026)	.048 (.063)	-.018 (-.024)
HSGPA	.018** (.102)	.012 (.066)	.012* (.091)	.005 (.038)	.016* (.093)	.004 (.022)	.040** (.189)	.025** (.116)	.037** (.207)	.022** (.126)
PARASP	.006 (.013)	-.003 (-.006)	-.003 (-.008)	-.012 (-.034)	.038* (.082)	.023 (.050)	.018 (.032)	.001 (.002)	.002 (.047)	.008 (.017)
EDGOAL1	-.009 (-.011)	-.049 (-.064)	-.021 (-.035)	-.059** (-.099)	-.019 (-.024)	-.068* (-.087)	.013 (.013)	-.036 (-.039)	-.004 (-.005)	-.055* (-.070)
ACADSC	.037 (.048)	.009 (.023)	.048* (.081)	.021 (.036)	.014 (.018)	-.025 (-.031)	.013 (.014)	-.028 (-.030)	.024 (.031)	-.013 (-.017)
COLGPA		.007 (.024)		.017 (.073)		.040** (.132)		.056** (.153)		.051** (.165)
COLSAT		.045* (.068)		.040* (.078)		.085** (.128)		.109** (.132)		.069** (.102)
EDGOAL2		.097** (.226)		.089** (.269)		.114** (.264)		.112** (.214)		.112** (.255)
WORKHRS		-.002 (-.046)		-.001 (-.027)		-.000 (-.002)		-.002 (-.033)		-.005** (-.099)
R ²	.034	.086	.044	.124	.056	.166	.099	.200	.086	.232
ADJ. R ²	.024	.072	.035	.110	.046	.154	.090	.188	.072	.220

*Significant, $p < .05$ **Significant, $p < .01$

Table 3

Determinants of Persistence in Public Four-Year Colleges (N=689)

	SAME2	SAME2	P2	P2	P3	P3	BA76	BA76	BA79	BA79
MALE	.074*	.072*	.038	.041	-.020	-.008	-.166**	-.143**	-.083*	-.062
	(.084)	(.082)	(.053)	(.058)	(-.022)	(-.008)	(-.179)	(-.155)	(-.084)	(-.062)
BLACK	.038	.012	.018	.014	.024	-.015	-.007	-.010	-.029	-.051
	(.032)	(.010)	(.019)	(-.015)	(.019)	(-.012)	(-.006)	(-.008)	(-.021)	(-.037)
SES	-.003	-.003	.003	.003	.005	.004	.001	-.001	.003	.002
	(-.045)	(-.054)	(.060)	(.052)	(.072)	(.048)	(.012)	(-.006)	(.049)	(.033)
ABILITY	.013	.004	.000	.015	.038	.019	.069*	.063*	.054	.040
	(.021)	(.006)	(.000)	(-.029)	(.019)	(.028)	(.104)	(.095)	(.076)	(.056)
HSGPA	.018*	.014	.013*	.008	.017*	.009	.024**	.012	.029*	.017*
	(.101)	(.080)	(.086)	(.054)	(.090)	(.048)	(.126)	(.063)	(.149)	(.084)
PARASP	-.000	-.003	-.011	-.014	.001	-.003	.047*	.040	.023	.016
	(-.003)	(-.005)	(-.022)	(-.027)	(.064)	(-.006)	(.076)	(.066)	(.036)	(.025)
EDGOAL1	.003	-.055	.014	-.048	.076*	.001	.077*	.037	.112**	.046
	(.003)	(-.010)	(.019)	(-.068)	(.084)	(.002)	(.085)	(.041)	(.115)	(.048)
ACADSC	.022	-.018	.026	-.014	.044	-.007	.026	-.010	.028	-.023
	(.034)	(-.064)	(.050)	(-.027)	(.065)	(-.011)	(.039)	(-.015)	(.035)	(-.031)
COLGPA		.003		.013		.029*		.057**		.055**
		(.035)		(.051)		(.086)		(.169)		(.154)
COLSAT		.024		-.009		-.008		.060		.034
		(.035)		(-.016)		(-.012)		(.085)		(.045)
EDGOAL2		.166**		.169**		.201**		.100**		.171**
		(.343)		(.429)		(.398)		(.197)		(.313)
WORKHRS		-.001		-.002*		-.004**		-.001		-.003*
		(-.019)		(-.081)		(-.101)		(-.040)		(-.072)
R ²	.022	.133	.019	.200	.046	.216	.099	.189	.084	.223
ADJ. R ²	.009	.116	.007	.184	.035	.202	.088	.174	.072	.208

*Significant, $p < .05$ **Significant, $p < .01$

Table 4

Determinants of Persistence in Two-Year Colleges (N=1092)

	SAME2	SAME2	P2	P2	P3	P3	BA76	BA76	BA79	BA79
MALE	.055 (.059)	.054 (.058)	.022 (.026)	.014 (.016)	.063* (.063)	.058* (.058)	-.051* (-.069)	-.040 (.054)	.012 (.013)	.024 (.036)
BLACK	-.012 (-.007)	-.046 (-.025)	.078 (.047)	.029 (.017)	.041 (.021)	-.024 (-.012)	.066 (.045)	.038 (.026)	.067 (.035)	.013 (.007)
SES	-.004 (-.050)	-.004 (-.058)	.002 (.026)	.001 (.011)	.006* (.074)	.004* (.055)	.001 (.016)	.000 (.000)	.004 (.052)	.003 (.036)
ABILITY	-.007 (-.011)	-.009 (-.014)	.012 (.019)	.003 (.004)	.026 (.035)	-.004 (-.006)	.020 (.038)	-.004 (-.007)	.052* (.074)	.173 (.025)
HSGPA	.021** (.128)	.018** (.111)	.021** (.140)	.017** (.112)	.023** (.126)	.014* (.080)	.026** (.159)	.018** (.138)	.035** (.203)	.025** (.143)
PARASP	.019 (.039)	.066 (.013)	.019 (.044)	.001 (.003)	.043* (.083)	.023 (.044)	.026* (.068)	.019 (.048)	.063** (.125)	.048** (.097)
EDGOAL1	.021 (.032)	-.015 (-.023)	.052** (.088)	-.005 (-.008)	.082** (.116)	.009 (.013)	.069 (.037)	.036* (.068)	.100** (.146)	.043* (.063)
ACADSC	.036 (.054)	.021 (.032)	.051** (.084)	.027 (.044)	.055* (.076)	.021 (.029)	.020 (.037)	-.002 (-.003)	.021 (.031)	-.009 (-.014)
COLGPA		-.019 (-.055)		-.024* (-.076)		.004 (.012)		.032** (.119)		.034** (.096)
COLSAT		.037 (.051)		.044* (.066)		.021 (.027)		.024 (.042)		.017 (.022)
EDGOAL2		.091** (.204)		.146** (.360)		.182** (.379)		.073** (.206)		.131** (.282)
WORKHRS		-.004** (-.119)		-.004** (-.139)		-.004** (-.108)		-.001* (-.057)		-.004** (-.109)
R ²	.031	.086	.057	.198	.085	.224	.099	.161	.138	.237
ADJ. R ²	.024	.076	.050	.186	.078	.215	.092	.152	.132	.228

*Significant, $p < .05$ **Significant, $p < .01$

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Appendix 1

Means, Standard Deviations, and Percent Missing Data Recoded to Mean

	TWOYR			PUBCOMM			RESUNIV			LIBART		
	MEAN	SD	%MD	MEAN	SD	%MD	MEAN	SD	%MD	MEAN	SD	%MD
MALE	1.53	.50	0.0	1.48	.50	0.0	1.56	.49	0.0	1.45	.50	0.0
BLACK	1.07	.25	0.0	1.16	.37	0.0	1.07	.25	0.0	1.11	.31	0.0
SES	1.18	6.53	0.0	1.16	6.97	0.0	5.38	7.01	0.0	4.30	7.50	0.0
HSGPA	7.93	2.80	5.1	8.92	2.46	7.6	10.29	2.34	3.1	9.43	2.65	2.7
ABILITY	5.24	.69	3.7	5.39	.70	4.3	5.86	.55	4.4	5.64	.65	5.6
PARASP	4.52	.96	12.7	4.96	.76	10.5	5.11	.89	5.5	4.99	.89	7.4
EDGOAL1	2.66	.70	12.9	3.11	.51	15.4	3.35	.53	7.0	3.25	.55	6.4
ACADSC	4.42	.69	.8	4.48	.68	1.2	4.71	.53	.5	4.65	.59	.2
COLGPA	5.49	1.35	3.5	5.38	1.38	4.5	5.78	1.35	3.8	5.56	1.28	3.3
COLSAT	3.73	.64	8.2	3.66	.65	3.8	3.78	.62	3.4	3.82	.63	3.4
EDGOAL2	2.72	1.04	2.0	3.13	.91	3.5	3.43	.95	2.9	3.39	.94	3.3
WORKHRS	13.21	14.52	2.7	8.71	12.39	3.5	3.34	8.54	2.8	4.25	8.60	1.8
SAME2	1.68	.46	0.0	1.74	.44	0.0	1.79	.41	0.0	1.76	.43	0.0
P2	1.77	.42	0.0	1.85	.36	0.0	1.89	.32	0.0	1.89	.31	0.0
P3	1.52	.50	0.0	1.70	.46	0.0	1.78	.41	0.0	1.79	.40	0.0
BA76	1.16	.37	0.0	1.31	.46	0.0	1.53	.50	0.0	1.58	.49	0.0
BA79	1.36	.48	0.0	1.57	.49	0.0	1.77	.42	0.0	1.77	.42	0.0